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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/316,518	05/21/1999	KENNETH L. STANWOOD	ENS-002-PAP	7910

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EXAMINER	
LY, ANH VU H	

ART UNIT	PAPER NUMBER
2667	17

DATE MAILED: 10/29/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/316,518	STANWOOD ET AL.	
	Examiner	Art Unit	
	Anh-Vu H Ly	2667	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *29 August 2003* .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *24-51,70-73 and 78-96* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *78-87* is/are allowed.

6)☒ Claim(s) *24-51,70-73 and 88-96* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. This communication is in response to applicant's amendment filed August 29, 2003. The proposed amendment to the claims has been entered. Claims 24-51, 70-73, and 78-96 are pending.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 24, 26-38, 42-48, 50-51, 72, and 88-91 are rejected under 35 U.S.C. 102(e) as being anticipated by Papadopoulos et al (US Patent No. 5,594,720).

With respect to claims 24, 26-34, 36, 38, 42-48, 50-51, 72, and 88-91, Papadopoulous et al discloses (col. 5, lines 11-52 and Fig 4) a format for frame 401. Frame 401 is divided into four sections. Call management sections are handled by uplink control section 405, which contains bits for handling requests for uplink information slots, and downlink control section 407, which contains bits indicating which uplink and downlink information slots are assigned for the uplink and downlink users to send and receive information. The remainder of frame 401 is divided into S slots, S=U + D + A, where U slots allocated for uplink information transfer and D slots allocated for downlink information transfer. The number of slots allocated between uplink section 410 and downlink section 415 can vary with each frame as indicated by partition 412.

Wherein, the partition 412 between the uplink and downlink slots varies according to demand (uplink and downlink bandwidth requirements in a frame are determined, calculated, and allocated using associated and respective bandwidth utilization parameters). Further, such dynamic bandwidth allocation is implemented in the cellular communication system, as illustrated in Fig. 1 (periodically enabling uplink transmissions during allocated uplink time slots and downlink transmissions during allocation downlink time slots).

With respect to claims 35 and 37, Papadopoulous et al discloses in Fig. 7, a diagram of partially-shared time division duplexing frame format (a frame comprises N time slots); wherein, a number of slots 715 allocated for downlink transmission (a first number N1 time slots allocated for downlink transmissions only) and wherein, the remaining slots 710 and 720 allocated for uplink and downlink transmissions (allocating the remaining N2 time slots for both uplink and downlink transmissions).

3. Claims 70-71 and 73 are rejected under 35 U.S.C. 102(e) as being anticipated by Raith et al (US Patent No. 5,729,531).

With respect to claims 70-71 and 73, Raith et al discloses (see Abstract) a general allocation method to approximately evenly distribute the mobile stations on the available channels (initializing the base station with an initial set of bandwidth utilization parameters, including a first estimate of the uplink and downlink bandwidth requirements of at least one CPE in a frame). After a mobile station begins active communication on the system, a second allocation (updating initial set of bandwidth utilization parameters with an actual set of

bandwidth utilization parameters based on the monitoring) is used to change the phase (slots), of some mobile stations on a channel, which has become heavily loaded (monitoring bandwidth use by at least one CPE and the base station).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 25, 39-41, 49, and 92-96 are rejected under 35 U.S.C. 103(a) as being unpatentable over Papadopoulos et al (US Patent No. 5,594,720) in view of Raith et al (US Patent No. 5,729,531).

With respect to claims 25 and 49, Papadopoulos et al discloses a method of dynamically allocating time slots within a frame for uplink and downlink transmissions. Papadopoulos et al does not disclose uplink and downlink bandwidth requirements are initially determined when the link is installed in the communication system. Raith et al discloses (see Abstract) a method of evenly distributed bandwidth of the available channels to the mobile stations before the mobile stations actively communicated in the system. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the feature of allocating bandwidth to the mobile stations before the mobile stations actively communicated in Papadopoulos et al's system, as suggested by Raith et al, for initial data transmissions.

With respect to claims 39-41 and 92-96, Papadopoulos et al discloses a method of dynamically allocating time slots within a frame for uplink and downlink transmissions. Papadopoulos et al does not disclose statistical bandwidth parameters comprise both an initial and actual set of statistical parameters reflective of the bandwidth requirements of the communication link. Raith et al discloses (see Abstract) a general allocation (initial set of statistically parameters reflective of bandwidth requirements) method to approximately evenly distribute the mobile stations on the available channels. After a mobile station begins active communication on the system, a second allocation (actual set of statistical parameters reflective of bandwidth requirements) is used to change the phase (slots), of some mobile stations on a channel, which has become heavily loaded. It would have been obvious to one having ordinary skill in the art at the time the invention was made to include the feature of allocating bandwidth to the mobile stations according to the initial and actual set of statistical parameters in Papadopoulos et al's system, as suggested by Raith et al, to flexibly accommodate different transmissions needs.

Allowable Subject Matter

5. Claims 78-87 are allowed.

The prior art does not teach or fairly suggest the step of wherein the actual set of bandwidth parameters are calculated as follows:

$$\begin{pmatrix} U^{(M)}_{n+1} \\ D^{(M)}_{n+1} \end{pmatrix} = \alpha_M \begin{pmatrix} U^{(M)}_{n} \\ D^{(M)}_{n} \end{pmatrix} + (1-\alpha_M) \begin{pmatrix} (U_n - D^{(1)}_n)^M \\ (D_n - D^{(1)}_n)^M \end{pmatrix}$$

wherein $\alpha_M \leq 1$, $M > 1$

$$\begin{pmatrix} U^{(1)}_{n+1} \\ D^{(1)}_{n+1} \end{pmatrix} = \alpha_1 \begin{pmatrix} U^{(1)}_{n} \\ D^{(1)}_{n} \end{pmatrix} + (1-\alpha_1) \begin{pmatrix} U_n \\ D_n \end{pmatrix} \text{ and}$$

wherein $\alpha_1 < 1$, $M = 1$;

and wherein U (M)n, D(M)n comprising uplink and downlink filtered moments, respectively, of order M at an instant n, and wherein Un, Dn respectively comprising an uplink and downlink accumulated bandwidth requirements influenced by the actual bandwidth utilization, as specified in independent claim 78.

The prior art does not teach or fairly suggest the steps of (a) summing all of the uplink bandwidth requirements as follows: for each interger value of k between 1 and M,

$$S_u^{(k)} = \sum \sqrt[k]{U^{(k)}}$$

(b) summing all of the downlink bandwidth requirements as follows: for each integer value of k between 1 and M, $S_d^{(k)} = \sum \sqrt[k]{D^{(k)}}$

(c) Calculating an estimated bandwidth allocation scheme as follows:

$$\hat{N}_d = INT\left[\sum_{k=1}^{M} \frac{N_k S_d^{(k)}}{S_d^{(k)} + S_u^{(k)}}\right], \quad \hat{N}_u = N - \hat{N}_d ;$$

(d) Comparing the estimated bandwidth allocation scheme calculated in step c with the allocation scheme currently used, wherein the allocation scheme currently used is defined as Nd, Nu; and

(e) replacing Nd and Nu with the estimated bandwidth allocation scheme calculated in step c if (Nd – Nd hat) >= u, where u comprises a pre-determined threshold, as specified in independent claim 82.

Response to Arguments

6. Applicant's arguments filed August 29, 2003 have been fully considered but they are not persuasive.

Applicant argues on page 12 that Papadopoulos does not appear to address in any manner allocation based on class of service. Examiner respectfully disagrees, as stated in the above rejections, that available slots are dynamically allocated in accordance with the user demand. Herein, each user demand is varied among a plurality of users; therefore the bandwidth allocation or time slots allocation is also varied. Higher demand requires more time slots, therefore, users with more time slots allocated are prioritized over users with less time slots since each user is not assigned with the same number of time slots in the communications; therefore, allocation based on user demand is considered as equivalent to allocation based on class of service by examiner.

Further, applicant argues on page 12 that the changes in the allocation of the uplink/downlink split appear to only be reactive and are never forward looking or predictive. Examiner respectfully disagrees, as recited in the amended independent claim 24 "predicting an uplink bandwidth requirement and a downlink bandwidth requirement of the communication link; wherein the uplink and downlink bandwidth requirements are determined using associated and respective uplink and downlink **bandwidth utilization parameters**"; herein, the uplink/downlink bandwidth requirements are determined or predicted using uplink/downlink bandwidth utilization parameters. Wherein bandwidth utilization parameters are currently utilized parameters of the communication link in an uplink and downlink communication. Therefore, such predicting or determining step is also reactive to the current bandwidth utilization parameters. Furthermore, applicant states in line 5 of independent claim 24 that "**predicting** an uplink bandwidth requirement... communication link", however, applicant states, in line 7 that "bandwidth requirements are **determined** ... parameters". Therefore, predicted and

determined are considered equivalent by the examiner. If the bandwidth requirements of the communication link are predicted then the bandwidth requirements are also predicted using associated and respective uplink and downlink bandwidth utilization parameters. Furthermore, as recited in dependent claim 27 "wherein the uplink and downlink bandwidth requirements are determined by periodically **monitoring requests** for uplink and downlink transmissions in the communication link". Herein, applicant's invention appears to be reactive also.

Conclusion

7. THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

8. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh-Vu H Ly whose telephone number is 703-306-5675. The examiner can normally be reached on Monday-Friday 7:00am - 4:00pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chi Pham can be reached on 703-305-4378. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-305-4750.

avl

CHI PHAM
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600 10/28/03